

List of Contents

NUMBER 1

Flexible spacecraft maneuver: inverse attitude control and modal stabilization	Sahjendra N. Singh	1
Assessment of existing and future launch vehicle liquid engine development	E. Stampfli and L. Meyer	11
POSEIDON solid state altimeter		
P. Raizonville, N. Lannelongue, J. C. Anne and P. de Chateau Thierry		23
Marangoni instability with non-uniform volumetric energy sources due to incident radiation	T. T. Lam and Y. Bayazitoglu	31
SSC microgravity sounding rocket program MASER	Rolf Jönsson	39
Television ground tracking applied to aerospace and astronomical events	P. D. Maley	45
The global tracking networks for crustal dynamics	Robert J. Coates	53
A solar attitude controller for extending operational life-span of communications satellites	K. Kumar	61
The development of the 15-meter hoop column deployable antenna system with final structural and electromagnetic performance results	G. Campbell, M. C. Bailey and W. K. Belvin	69
Structural concepts for large solar concentrators	John M. Hedgepeth and Richard K. Miller	79
Space Station design for growth	E. Brian Pritchard	91
Advanced power supply and distribution systems for Columbus	Gert Eggers	99
The use of computer graphic simulation in the development of robotic systems	Ken Fernandez	115
A search for narrow band signals with SERENDIP II: a progress report	D. Werthimer, R. Brady, A. Berezin and S. Bowyer	123
Panspermia: unlikely, unsupported, but just possible	R. E. Davies	129
ACADEMY TRANSACTIONS NOTES		
Optimal escape trajectory in the case of "exponential rocket" of Esnault Pelterie	Pierre Contensou	137
A device for energy and intensity analysis of data from X-ray telescope	L. Filipov, V. Markov, Ch. Blitznakov and V. Genov	141
The CNES S-band network and the international cooperation	P. Bescond and G. Jeambrun	143
Effects of microgravity and hypergravity on the cell: investigations on <i>Paramecium tetraurelia</i>	G. Richoilley, R. Tixador, J. Templier, G. Gasset and H. Planel	147
Comments on "Future law of outer space rescues"	E. R. Finch Jr and V. S. Vereschetin	151
EX MUNDO ASTRONAUTICO		153

NUMBER 2

SPACE LIFE SCIENCES

Preface

H. M. Wegmann and R. J. White xi

1. HUMAN ADAPTATION TO THE SPACE ENVIRONMENT

Review of basic medical results of the Salyut-7-Soyuz-T 8-month manned flight

O. G. Gazenko, E. B. Schulzhenko, A. I. Grigoriev, O. Yu. Atkov
and A. D. Egorov 155

The endocrine system in space flight

C. S. Leach, P. C. Johnson and N. M. Cintron 161

Neurohumoral mechanism of space motion sickness

A. I. Grigoriev, A. D. Egorov and I. A. Nichiporuk 167

Central and regional hemodynamics in prolonged space flights

O. G. Gazenko, E. B. Shulzhenko, V. F. Turchaninova and A. D. Egorov 173

Plasma and urine catecholamine levels in cosmonauts during long-term stay on
Space Station Salyut-7R. Kvetňanský, N. A. Davydova, V. B. Noskov, M. Vigaš, I. A. Popova,
A. C. Ušakov, L. Macho and A. I. Grigoriev 181

2. BIOMEDICAL SUPPORT OF MAN IN SPACE

Biomedical support of man in space

D. R. Pendergast, A. J. Olszowka, M. A. Rokitka and L. E. Farhi 187

Assessment of the efficacy of medical countermeasures in space flight

A. Nicogossian, F. Sulzman, M. Radtke and M. Bungo 195

The prevention of adverse physiological change in Space Station crewmembers

Paul C. Rambaut 199

Vestibular factors influencing the biomedical support of humans in space

Byron K. Lichtenberg 203

3. HUMAN FACTORS IN SPACE

Assessment of Space Station design and operation through bioastronautics

K. E. Klein, B. J. Bluth and H. M. Wegmann 207

Ethical problems of interaction between ground-based personnel and orbital
station crewmembers

A. I. Grigoriev, O. P. Kozerenko, V. I. Myasnikov and A. D. Egorov 213

Space Station habitability research

Yvonne A. Clearwater 217

Habitability design of European spacecraft Hermes—ergonomic aspects

A. Coblenz, E. Fossier, G. Ignazi and R. Mollard 223

The recruitment and organizational integration of space personnel

K.-M. Goeters 227

4. IONIZING SPACE RADIATION

Radiation dose and shielding for the Space Station

Percival D. McCormack 231

Radiation problems in manned spaceflight with a view towards the Space Station

H. Bücker and R. Facius 243

5. ANIMAL MODELS

Animals in biomedical space research

Robert W. Phillips 249

Correlation of macro and micro cardiovascular function during weightlessness and simulated weightlessness	
P. M. Hutchins, T. H. Marshburn, T. L. Smith, S. W. Osborne, C. D. Lynch and S. J. Moultsby	253
The response of structure and function of the gravireceptor in a vertebrate to near weightlessness	
J. Neubert, W. Briegleb, A. Schatz, I. Hertwig and B. Kruse	257
Changes of insulin effect on lipogenesis and insulin binding receptors during hypokinesia	
L. Macho, M. Fickova and S. Zorad	263
6. PLANT GROWTH IN SPACE	
Microgravity and the organisms: results of the Spacelab mission D1	
D. Volkmann	267
Experiments and appropriate facilities for plant physiology research in space	
W. Lork	271

NUMBER 3

OTV aeroassist with low L/D	
W. H. Willcockson	277
Optimal lift and bank modulations for three-dimensional reentry trajectories with heat constraint	
Jeng-Shing Chern, Ching-Yew Yang and Jyh-Jong Sheen	303
Operating the Hubble Space Telescope	
Charles F. Fuechsel	311
Deep space network enhancement for the Galileo mission to Jupiter	
T. K. Peng, J. W. Armstrong, J. C. Breidenthal, F. F. Donivan and N. C. Ham	321
Development status of LE-7	
Yoshihiro Torii, Eiji Sogame, Kenjiro Kamijo, Takahiro Ito and Koichi Suzuki	331
Development of a "Hingeless Mast" and its applications	
Takayuki Kitamura, Kakuma Okazaki, Michihiro Natori, Koryo Miura, Shigeru Sato and Akira Obata	341
Space Station as a vital focus for advancing the technologies of automation and robotics	
Giulio Varsi and Daniel H. Herman	347
Alternatives for mapping from satellite imagery	
G. Konecny	355
An expert system approach to determination of tropospheric error in microwave ranging	
M. J. Nahvi	359
ACADEMY TRANSACTIONS NOTE	
A scientific society's on-the-job training in satellite teleconferencing	
Helen L. Bishop and Robert D. Watkins	367
EX MUNDO ASTRONAUTICO	
	371

NUMBER 4

SPACE COMMERCIALIZATION

Preface	George A. Hazelrigg Jr and Madeleine E. Hymowitz	xii
Research in space: prelude to commercialization	George A. Hazelrigg Jr and Madeleine E. Hymowitz	375
Space transportation system interactive conceptual design/cost/economics model	Malcolm G. Wolfe and Frank L. Knight	387
Cost reduction for future communication satellites by a standardized propulsion module (OPM)	D. E. Koelle, W. Müller and H. Schweig	397
Cost-effective applications in space transportation decision support systems	Michael J. Davis and Joel S. Greenberg	407
Design and economics of a free-flying platform for space manufacturing	Richard Boudreault	415
Potential economic implications of the development of space tourism	P. Q. Collins and D. M. Ashford	421
Space transportation—the key to the utilization of extraterrestrial resources	H. H. Koelle	433
Comparison of alternative concepts for lunar surface transportation	Uwe Apel	445
Asteroid mining and the moons of Mars	Brian O'Leary	457

NUMBER 5

<i>Editorial</i>		
<i>Acta Astronautica</i> and Pergamon	J.-P. Marec	ix
The case for an international lunar base	IAA <i>Ad Hoc</i> Committee "Return to the Moon"	463
Astrodynamic problems of the Space Station	IAF Astrodynamic Committee	491
MUSES-A double lunar swingby mission	Kuninori Uesugi, Tomonao Hayashi and Hiroki Matsuo	495
Gravitational effects on the structure and propagation of premixed flames	A. Hamins, M. Heitor and P. A. Libby	503
Status of advanced propulsion for space-based orbital transfer vehicle	Larry P. Cooper and Dean D. Scheer	515
Fuel cell systems for space applications in Europe	H. Gehrke, J. Heyn and G. Dietrich	531
Energy-mass spectrometer for low energy weak ion flux analysis	Y. Semkova, R. Koleva, P. Baynov, E. Savov, N. Kanchev, O. Vaysberg, V. Smirnov, A. Fedorov and A. Leybov	539
High resolution detection sub-assembly of the SPOT camera: on-orbit results and future developments	C. Henry, A. Juvigny and R. Serradeil	545
Antenna system alternatives for data relay satellites with multiple steerable beams	Hans Dodel, Dietmar Fasold, Eberhard Frisch and Manfred Lieke	553
Fan rib type deployable mesh antenna for satellite use	T. Itanami, M. Minomo and I. Ohtomo	561

Space Station atmospheric monitoring systems		
C. Buoni, R. Coutant, R. Barnes and L. Slivon	567	
ACADEMY TRANSACTIONS NOTES		
The Advanced X-ray Astrophysics Facility (AXAF)		
M. C. Weisskopf	575	
Nano-g environment on the Orbiter or Space Station		
Friedrich O. von Bun, Owen K. Garriott and Don J. Pearson	579	
Gravitational wave searches with ground tracking networks		
Frank B. Estabrook	585	

NUMBER 6

THE USE OF THE GEOSTATIONARY ORBIT

Selected Papers Presented at the 38th Congress of the International Astronautical Federation, Brighton, U.K., 10-17 October 1987

Foreword

Eilene Galloway	xi
The scientific and technical aspects of the geostationary orbit	
Luboš Perek	589
The current legal regime of the geostationary orbit and prospects for the future	
N. Jasentuliyana and R. Chipman	599
The role of the ITU in the use of the geostationary orbit	
R. E. Butler	607
INMARSAT, a model of international cooperation	
Olof Lundberg	611
The role of INTELSAT in the use of the geostationary orbit	
David M. Leive	615
Viewpoints of the equatorial countries toward geostationary orbit. Results of 12 years of controversy	
Aldo Armando Cocca	621
Proposal by the German Democratic Republic on use of the geostationary orbit	
W. Hampe and R. Mueller	631
Equitable aspects of access to and use of the geostationary satellite orbit	
Stephen E. Doyle	637
Developing countries and use of the geostationary orbit	
Priyatna Abdurrasyid	647
Discussion (Summary)	
Marietta Benkő	653

NUMBER 7

FUTURE LUNAR BASE

*Papers presented at the
37th Congress of the International Astronautical Federation,
Innsbruck, Austria, 4-11 October 1986*

Preface

H. H. Koelle	xi
Man and the Moon—the history of lunar exploration	
George E. Mueller	655
Lunar settlements—a socio-economic outlook	
B. J. Bluth	659

Development of a lunar infrastructure	J. D. Burke	669
Scientific investigations at a lunar base	Michael B. Duke and Wendell W. Mendell	675
Lunar manufacturing: a survey of products and processes	R. D. Waldron	691
Lunar-based power systems	D. R. Criswell and R. D. Waldron	709
Logistics support of lunar bases	Gordon R. Woodcock	717
Mission analysis and phased development of a lunar base	Barney B. Roberts	739

NUMBER 8**30 YEARS OF PROGRESS IN SPACE**

*Selected papers presented at the
38th Congress of the International Astronautical Federation,
Brighton, U.K., 10-17 October 1987*

Automatic stabilized platform of "Vega" interplanetary stations for pointing scientific instrumentation to Halley's Comet	V. M. Balebanov, G. I. Zubenko, D. A. Voronov, B. Valnicek, I. Rechek and I. Rujichka	751
The flight telerobotic servicer (FTS): a focus for automation and robotics on the Space Station	S. W. Hinkal, J. F. Andary, J. G. Watzin and D. E. Provost	759
Columbus pressurized modules: Aeritalia role in manned space systems	E. Vallerani, L. D'Emiliano and D. Boggiatto	769
Technology for submillimeter wave remote sensing	Martin M. Sokoloski and James Cutts	779
Mapping of wasteland of India: a case study of Bangalore district of Karnataka	G. Behera, C. B. S. Dutt, P. P. Nageswara Rao, A. K. Gupta, J. Krishnamurthy, K. Ganesharaj, A. S. Padmavathy and N. Yogarajan	787
French approach in future launch systems	J. C. Bouillot, C. Fazi and J. M. Roubertie	793
Launch processing system operations with a future look to operations analyst (OPERA)	Astrid E. Heard	807
Collector and receiver designs for high temperature Brayton cycle for space application	W. J. Denner, A. Fritzsche and G. Helwig	819
Plasma contactors for use with electrodynamic tethers for power generation	D. E. Hastings and N. A. Gatsonis	827
Parametric design study of a 20 kN high performance storable propellant pump-fed engine	U. Palmnäs and R. Sundén	837
Investigation of antimatter air-breathing propulsion for single-stage-to-orbit ships	H. D. Froning Jr	853
The use of advanced materials in space structure applications	D. C. G. Eaton and E. J. Slachmuylers	863

Optimal time-free nodal transfers between elliptical orbits	
Nguyen X. Vinh, Shau Hern Kuo and Christian Marchal	875
“Minimal” orbital dynamics	
A. J. Sarnecki with an Appendix by R. H. Gooding	881
Space operations and data system for the H-II and Space Station era	
Hideo Hara and Makoto Kajii	893
The anisotropy of the microwave background: space experiment “Relict”	
I. A. Strukov, D. P. Skulachev and A. A. Klypin	903
A new type of orbits for INMARSAT’s 3rd generation (mobile communication and navigation)	
J. Nauck, H. J. Günther and K. Plate	909
Development of on-board satellite communications equipment in the geo-stationary platform era	
Hiroshi Uda, Yuichi Otsu, Nobuo Ishizu, Kimio Miyasaka and Fusaki Matsui	915
Availability status of motors for student experimental rockets	
G. Pignolet, F. Cserep, M. Hallet, C. J. Piper and G. S. James	921
Safety awareness continuity in transportation and space systems	
John C. Macidull	931
Propulsion concepts for nuclear matter compression energy and “cold” fusion energy sources in interstellar flight	
M. Subotowicz	937

NUMBER 9

Potential directions for a second generation Space Shuttle	
Ivan Bekey	943
Prospects for advanced rocket-powered launch vehicles	
Charles H. Eldred and Theodore A. Talay	953
Status and tendencies for low to medium thrust propulsion systems	
Helmut Hopmann, Richard Pitt, Manfred Schwende and Helmut Zewen	961
A new Space Station power system	
Geoffrey A. Landis	975
Solar array mechanisms for Indian satellites, APPLE, IRS and INSAT-IITS	
Samiran Das and I. Selvaraj	979
Space construction results: the EASE/ACCESS flight experiment	
Ivan Bekey	987
Diffusion-convection effects on constrained dendritic growth in dilute alloys	
Huang Tao, Lu Deyang and Zhou Yaohe	997
Flood boundary delineation through clouds and vegetation using L-band space-borne radar: a potential new tool for disease vector control programs	
Marc L. Imhoff and S. W. McCandless	1003
Plans for the use of the Olympus satellite	
C. D. Hughes and P. Bartholomé	1009
Relativistic interstellar flight and Gaussian noise	
Claudio Maccone	1019

Contents

International cooperation between "Vega" and "Giotto" projects within the Pathfinder concept	
R. S. Kremnev, V. I. Shevchenko, K. G. Sukhanov, E. L. Akim, N. M. Ivanov, P. E. Elyasverg and O. V. Papkov	1029
Giotto—the mission operations system	
David E. B. Wilkins	1033
EX MUNDO ASTRONAUTICO	
In Memoriam—G. N. Duboshin	
E. P. Aksenov and M. Pascal	1045
In Memoriam—A. Busemann	
James Harford	1045
In Memoriam—Pierre Contensou	
J.-P. Marec	1046
In Memoriam—Charles Stark Draper	
George E. Mueller	1047
NUMBER 10	
Recent progress in astrodynamics	
IAF Astrodynamics Committee	1049
Attitude dynamics of three-body tethered systems	
A. K. Misra, Z. Amier and V. J. Modi	1059
Satellite navigation by stellar refraction	
J. L. Lair, P. Duchon, P. Riant and G. Muller	1069
Intelligent, autonomous systems in space	
H. Lum and E. Heer	1081
Hybrid rocket propellants from lunar material	
Douglas R. Sparks	1093
Mobile satellite system for Europe—which is the optimum orbit configuration?	
J. R. Norbury, S. K. Barton and J. R. Stuart	1099
Project Horizon: an early study of a lunar outpost	
Frederick I. Ordway III, Mitchell R. Sharpe and Ronald C. Wakeford	1105
Fluid electrolyte and hormonal changes in conditioned and unconditioned men under hypokinesia	
Y. G. Zorbas, Y. F. Federenko and K. A. Naexu	1123
ACADEMY TRANSACTIONS NOTES	
Temperature distribution in satellite mounting plates due to conductive heat transfer	
Nellore S. Venkataraman and Claudio Oliveira Egalon	1127
"Powersat"	
H. O. Ruppe	1137

Pulmonary function in microgravity: Spacelab 4 and beyond	
H. J. Guy, G. K. Prisk and J. B. West	1139
EX MUNDO ASTRONAUTICO	
In Memoriam—G. Edward Pendray	1145
In Memoriam—Frank B. Voris	1146

NUMBER 11/12**MICROGRAVITY**

*A SELECTION OF PAPERS ON MICROGRAVITY PRESENTED AT
THE 38TH CONGRESS OF THE INTERNATIONAL ASTRONAUTICAL
FEDERATION, BRIGHTON, U.K., 10-17 OCTOBER 1987*

Preface	xii
----------------	-----

Part I—Flight Opportunities, Facilities and Infrastructures	
Interim Flight Opportunity (IFO)	
M. H. Aenishanslin and P. Eymar	1149

The Protein Crystallization Facility (PCF) for EURECA	
E. Schoen and F. Seifert	1155

Microgravity research and user support in the Space Station era: the Microgravity User Support Centre	
K. Wittmann, H. P. Schmidt and B. Feuerbacher	1161

MARS: a new center for microgravity research	
Luigi G. Napolitano	1169

Part II—Theoretical Modelling and Experimental Results	
Autoignition of fuel-oxidizer mixtures in microgravity	
A. L. Berlad and V. Tangirala	1179

Droplet vaporization in a supercritical microgravity environment	
E. W. Curtis and P. V. Farrell	1189

Sooting and disruption in spherically symmetrical combustion of decane droplets in air	
B. D. Shaw, F. L. Dryer, F. A. Williams and J. B. Haggard Jr	1195

Effect of direct current on the thermocapillary migration of droplets in microgravity	
V. M. Korovin	1203

The study of Marangoni convection and the solid/liquid interface shape on a germanium float zone in microgravity	
M. Z. Saghir	1211

Results of the TEXUS 14-B flights experiment on a floating zone. First approach towards telescience in fluid science	
R. Monti, R. Fortezza and G. Mannara	1221

Measurement and control of the liquid/solid interface temperature during the directional solidification by using the Seebeck effect

G. Cambon, G. Cadet, J. J. Favier, A. Rouzaud and J. Comera 1229

Navier-Stokes modelling of coupled interfacial and convective transport during the Ge epitaxial growth experiments of D1 mission

C. Mignon and B. Zappoli 1235

Investigations of gravity effect on crystal growth. Achievements and prospects

L. L. Regel' 1241

